Numerical Scheme for the Generalised Serre-Green-Naghdi Model - Reviewer Response

June 15, 2022

1 Introduction

We kindly thank the reviewers for their constructive advice on the paper which has helped improve it and will address each of their concerns below.

2 Reviewer 1

2.1 Comments

The manuscript is if high quality and after the revision it can be accepted for publication.

2.2 Response

Thanks!

This review requires no alterations to the paper.

3 Reviewer 2

3.1 Comments

Authors made some good improvement. They added some test cases with Experimental case.

1. To be blank, i didn't see which is better in Fig.11. Blue line and Black line, i.e. classical and improved SGN , i couldn't distinguish which is better.

2. Still, i think the motivation is not well written or written clearly.

   If motivation is the new scheme , then as authors states in the reply, " other numerical methods relying on smoothess of solutions such as the spectral method of Dutykh et al. (2018) for the regularised SWWE subfamily required filtering of the solutions to remove oscillations introduced by the method"

I suggest that authors should write these clearly into the paper, and provide the evidence or citation , to show there are stable problems or accuracy problems in the spectral method of Dutykh et al. (2018).

Then as the motivation, authors try to give a new scheme.

Comparison should be provided between new scheme and spectral method of Dutykh et al. (2018) or other published method. To show the new scheme is better than others.

If only shows new scheme is correct, without showing the advantages compared with other published method, then people may still use published others' method.

Above things are suggested to be shown in abstract, conclusions and introduction part, to show the contribution of this paper clearly.

3.2 Response

3.2.1 Issue 1

We have split Figure 11 into Figures 11 and 12, adding panels that zoom in on specific areas. Both these changes allow the black and blue lines to be better distinguished and thus compared. The supporting discussion has also been updated appropriately to match the altered figures.

3.2.2 Issue 2

We have have improved the motivation for the paper as communicated by the abstract, introduction and conclusions. While the suggested motivations were helpful and illustrated the reviewers issue with the previous motivation, the updated papers motivation is not wholly taken from their suggestions and is instead (summarised):

The first validated method for the gSGNE for general members of the family (any values of β_1 and β_2) as well as the comparison of the linear dispersion properties with example numerical solutions to the full nonlinear equations.

This point has been made clearer in the abstract, introduction and conclusion. Additional benefits of the numerical scheme have also been clearly made in the introduction. While the numerical method compares well to other methods for select values of β_1 and β_2, there are currently no methods for arbitrary values of β_1 and β_2, hence the novelty of the manuscript.